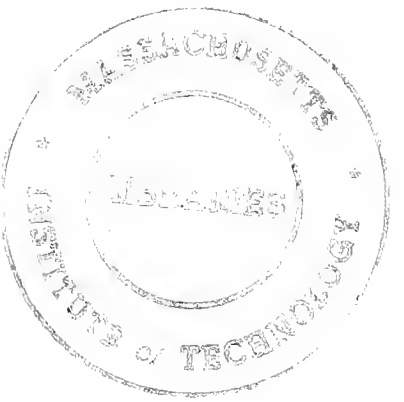
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ARE JAPANESE STOCK PRICES TOO HIGH?

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No. 547 February 1990

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ABSTRACT

The difference between reported price-earnings ratios in the United States and Japan is not as puzzling as it appears at first glance. Nearly half the disparity is caused by differences in accounting practices with respect to consolidation of earnings from subsidiaries and depreciation of fixed assets. If Japanese firms used U.S. accounting rules, we estimate that the P/E ratio for the Tokyo Stock Exchange would have been 32.1, not the reported 54.3, at the end of 1988. Accounting differences are unable, however, to explain the sharp rise in the Japanese stock market during the mid-1980s. Changes in required returns on equities, or in investor expectations of future growth for Japanese firms, must be invoked to explain this phenomenon. Real interest rates declined during the period of rapid price increase, but there is little evidence that growth expectations became more optimistic. The real interest rate changes do not, however, appear large enough to fully account for the change in stock prices.

We are grateful to David Boyle, Milan Brahmbhatt, Fumio Hayashi, Sarah Johnson, Deborah Kesler, Mark Sladkus, Atsushi Suzuki, Takanori Tanabe, Masahiro Tsuji, and Hiroaki Yamaji for providing us with data, to Fischer Black, Eugene Fama, Takatoshi Ito, Andrew Lo, Merton Miller, Myron Scholes, Larry Summers, Mark Wolfson, Kazuo Ueda, and Mark Zmijewski for helpful discussions, and to Paul Gompers for research assistance. This research was supported by the Alfred P. Sloan Foundation, the Center for Research in Security Prices, the National Institute for Research Advancement, and the National Science Foundation. It is part of the NBER Programs in Financial Markets and Monetary Economics and Taxation.

Japanese equities trade at a higher earnings multiple than shares in any other major equity market. At the end of 1989, the price-earnings ratio for the Nomura Research Institute (NRI) 350, a broad index of Japanese nonfinancial firms, was 53.7. The comparable ratio for the Standard and Poor's Industrial index of American stocks was 15.0, and the average P/E ratio for all nations except Japan in the Morgan Stanley-Capital International database was 13.6.

The large difference between price-earnings ratios in Japan and other markets is a recent phenomenon. In the early 1970s, Japanese P/E ratios were below P/Es in the United States. Between 1973 and 1985, Japanese P/Es were approximately twice those of the United States. Most of the recent divergence between the two P/Es occurred in 1986, when the Japanese ratio doubled from 29.4 to 58.6 while the U.S. P/E increased by only 20%, from 15.4 to 18.7.

The developments of the last decade in the Tokyo stock market have led many analysts to ask if high Japanese price-earnings ratios are consistent with much lower P/Es in other nations. Differences could be attributed to differential accounting practices and tax rules which complicate the international comparison of P/Es, or to divergences in required returns or expected earnings growth. This paper examines the most important differences between U.S. and Japanese financial accounting practices and tries to "correct" Japanese P/Es for comparison with U.S. values. We then ask whether the rapid growth in share values during the 1980s can be traced to fundamentals such as falling investor discount rates or increased growth expectations.

This paper is divided into five sections. The first presents a stylized overview of the U.S. and Japanese equity markets. We report the price-earnings and dividend-price ratios in both countries, as well as information on the size of each equity market, the volume of trade, and the composition of shareownership. The second section relates the rise in Japanese share prices

to the equally dramatic increase in land values. The escalation of Japanese land prices is simply another manifestation of recently-rising price-earnings multiples for assets in Japan relative to those elsewhere. Our analysis focuses on stock market valuation because available data on common stocks are far better than data on the cash flows from land and other real assets.

Section three explores the influence of accounting differences on the disparity between the price-earnings ratios of the two countries. We show that several factors make Japanese price-earnings ratios systematically higher than their U.S. counterparts, but none of these factors can account for the recent increase in Japanese P/E ratios. Section four examines differences in required after-tax returns and expected growth rates in the two countries. We first calibrate the changes in discount factors and growth expectations that would be needed to explain the recent increase in Japanese share values. We then consider various proxies for actual changes in required returns and growth expectations. We find that rather extreme assumptions would be needed to explain the post-1985 increase in Japanese share prices. There is a brief conclusion.

1. Overview of Japanese and U.S. Equity Markets

The relative importance of the Japanese and U.S. equity markets has shifted dramatically during the last two decades, the result of rapid growth in Japanese share prices and depreciation of the dollar. This section provides background information on these markets.

1.1 Market Size

The widely cited data from Morgan Stanley-Capital International (MSCI) Perspectives and other data sources imply that the Japanese equity market was 55% larger than the U.S. market at the end of 1988. However, these data

provide a misleading measure of relative market capitalization for two reasons. First, the U.S. data include only shares listed on the New York Stock Exchange (NYSE), thereby capturing less than 85% of the market value of listed U.S. shares.[1] A second and more important problem is that the reported market values are not adjusted for intercorporate share ownership, which causes double-counting of corporate shares. Because such cross-ownership is much more prevalent in Japan than in the United States, the size of the Japanese equity market is significantly overstated.[2]

An example illustrates the potential difficulty. Consider an economy with two firms, A and B, each with assets worth $100. If each firm relies exclusively on equity financing and there is no intercorporate ownership, the total value of traded equity will be $200. Suppose firm B now issues $50 in new shares and uses the proceeds to purchase one half of the equity in firm A. This transaction increases the market value of B to $150 ($100 in physical assets and $50 in shares of A), without affecting the market value of A. Although the value of the underlying productive assets remains unchanged at $200, the intercorporate purchase of stock raises the apparent value of the market to $250.

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[1]The market value of equity listed on the NYSE was $2088.7 billion in 1987, while the value of equity listed on the American Stock Exchange and other regional exchanges was $68.6 billion. Shares of domestic corporations (excluding mutual funds) traded in the NASDAQ over-the-counter market were valued at $325.5 billion [U.S. Securities and Exchange Commission Statistical Bulletin (1988) and National Association of Securities Dealers Yearbook (1988)]. The over-the-counter market is less important in Japan. For example, in 1986 the volume of shares traded on the First Section of the Tokyo Stock Exchange was 772 times the volume in the Tokyo OTC market [Japan Securities Research Institute (1988)].

[2]MacDonald (1989) illustrates this point with calculations for a set of particular Japanese companies.

The apparent market value overstates the value of the firms' underlying assets because half of A's assets are included in the equity of both firm A and firm B. One can eliminate this double-counting and get an accurate estimate of the underlying asset value by measuring only the value of equity held outside the corporate sector. In our example, the public holds $50 of A and $150 of B, so the value of shares held outside the corporate sector is $200, the value of the underlying assets. More generally, the value of the equity held outside the corporate sector is

$$(1) \qquad V_{Outside} = (1-s)*V_{Total}$$

where s is the fraction of the stock held by firms and V_{Total} is the total value of equity, including corporate crossholdings.

Table 1 reports data on the aggregate ownership of traded shares in both the United States and Japan.[3] In the United States, individuals hold about half of the outstanding equity either directly or through mutual funds. Intercorporate equity holdings account for only one seventh of total equity. This fraction excludes holdings by defined-benefit pension plans. The assets of these plans are arguably assets of the shareholders; including them as corporate cross-holdings would raise the intercorporate ownership to over twenty percent. Insurance companies, with holdings for both insurance operations and pension plans, own 23.9% of the market. The remaining equity

[3]The weights for the U.S. in Table 2 differ from the equity ownership weights in the Flow of Funds for two reasons. First, intercorporate shareholdings are "netted out" of the Flow of Funds, so nonfinancial firms appear with no equity holdings except a small stake in mutual funds. Following Tri (1971), we use IRS data on the ratio of dividends paid by U.S. corporations to domestic dividends received by U.S. corporations to estimate intercorporate holdings. Second, the Flow of Funds data on equity include stock in closely held corporations, worth $600 billion in 1987. Since we are concerned with marketable securities, we exclude this component. We assume that all closely held corporations are owned directly by individuals in removing this class of equity from the Flow of Funds aggregates.

holdings are diverse. Slightly more than 6% of the equity is held by foreig-

n-

ers and a similar fraction held by state and local government pension funds.

Corporations of various kinds hold nearly two thirds of the equity in Japan. These holdings includes nonfinancial corporations (30%), banks (20%), and insurance companies (17%). Direct individual holdings account for only one fifth of the market value of the Tokyo Stock Exchange (TSE). Moreover, the fraction of the Japanese market held by individuals has declined through time, from nearly 60% at the beginning of the 1950s to only 20% today.

Table 2 presents a detailed example of cross-ownership, the case of the Toyota Motor Company. Toyota owns more than 40% of four other firms on the TSE First Section, and at least five percent of twenty-two other companies. Most of these firms supply Toyota with inputs. In turn, several banks own nearly 30% of Toyota's stock. For many other firms, especially those which, unlike Toyota, are part of loosely-affiliated corporate groups, the degree of intercorporate holding is substantially greater.[4]

Table 3 presents both unadjusted and corrected measures of stock market value in the U.S. and Japan. The first two columns report unadjusted data, drawn from MSCI. Columns three and four report the value of Japanese and U.S. equity markets adjusted for intercorporate holdings. The adjustments have a surprising effect: even at the end of 1988, the market value of the outside equity in the Japanese market was <u>smaller</u> than that in the United States. Our adjusted values stand in striking contrast to the Morgan Stanley data. The market values reported by MSCI in December 1988 (1989) imply that the world equity shares of Japan and the United States are 44% (39.6%) and 29% (30.6%).

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[4]Hoshi, Kashyap, and Scharfstein (1989) discuss the linkages among firms in these groups and how it affects their financial behavior.

Our adjusted data reverse this ranking: the U.S. accounts for 35.9% of the world equity portfolio, and Japan for 28.7%, at the end of 1988. For 1989, the comparable fractions are 37.7% and 25.0%. These findings suggest that portfolio allocation rules based on the most widely used measures of market value, the MSCI indices, significantly overstate the importance of Japanese relative to U.S. equities.

1.2 Valuation, Trading, and Leverage Trends

Table 4 presents price-earnings ratios and dividend-price ratios for the NRI 350 index of nonfinancial Japanese firms and for the S&P Industrial index of nonfinancial American firms.[5] The disparity between Japanese and U.S. P/E ratios is apparent. Between 1974 and 1984, the Japanese P/E was about twice the U.S. P/E. During 1986, however, the Japanese P/E ratio doubled from 29.4 to 58.6, while the U.S. ratio increased by 21%, from 15.4 to 18.7. There also are large differences between the recent Japanese and American dividend/price ratios. The dividend yields are comparable in 1970, with values of 3.9% in Japan and 3.3% in the U.S. The U.S. dividend yield exhibits no particular trend over the 1970-88 period. In contrast, the Japanese dividend yield declines systematically. The dividend yields at the end of 1988 are 3.0% in

[5]We use the NRI 350 because other major indices of the Japanese market have limitations for our purposes. The aggregate P/E ratio for the First Section of the TSE includes financial firms, for which accounting issues are more complex than they are for nonfinancials. The MSCI indices also include financials. In addition they include consolidated earnings for some firms, and unconsolidated earnings for others. The average P/E ratio reported in the Daiwa Analysts Guide is the ratio of the average price and average earnings based on number of shares outstanding, not value, so it is less representative of the value-weighted market than the NRI measure. The TSE, MSCI, and Daiwa P/E ratios were 58.3, 52.7, and 82.4 at the end of 1987. The comparable ratio for the NRI 350 was 50.4. While some measures of aggregate Japanese P/Es were affected when the Nippon Telephone and Telegraph Company went public in 1987 with a price/earnings ratio of 285, this firm is not included in the NRI 350 index.

the U.S. and 0.6% in Japan.

Turnover rates, measured as the value of shares traded as a fraction of market capitalization, are similar on the NYSE and the TSE. Turnover rates for 1986-88 are .672, .806, and .687 in Tokyo and .624, .852, and .582 in New York. (See the 1988 TSE Fact Book and the 1988 NYSE Fact Book.) Thus, in two of the last three years of our sample, the turnover rate is higher in Tokyo than in New York.

Foreigners were net sellers of Japanese stocks during the period of most rapid price appreciation. Foreign equity ownership of U.S. stocks increased during both the 1970s and the 1980s, from 3.7% of the market in 1970 to 7.2% in 1988. Foreign holdings of Japanese stock also increased between the mid-1970s and the early 1980s, growing from less than 2.7% in 1978 to 8.8% in 1984. Since then, foreigners have been net sellers of Japanese equities. By 1988 foreign holdings of Japanese equities (4.8%) were only 55% of their previous peak value. This may reflect the perception outside Japan that Japanese equities have been overpriced throughout the mid-1980s. This sentiment may also be reflected in the heavy trading activity in recently-introduced put options on the Japanese market [Norris (1990)], which doubled in value during their first few weeks of trading despite relatively small changes in the value of the underlying index.

Some have argued that the large stock returns and high P/E ratios in Japan are the result of high debt-equity ratios. This explanation is inconsistent with the debt-equity ratios reported in Table 4. These ratios are book debt divided by the market value of equity. In Japan, where most debt is short-term, the differential between market and book values for debt is small. The divergence could be larger for the United States. The American debt-equity ratios exhibit no particular trend, varying between .48 (1972) and 1.04

(1974). In contrast, Japanese debt-equity ratios decline during the sample period, from 1.63 in 1970 and 2.23 in 1972, to .36 in 1988. While Japanese debt-equity ratios are substantially higher than their U.S. counterparts during the 1970s, they are significantly below U.S. debt-equity ratios during the critical 1986-88 period.

2. Japanese Share Prices and Land Values

Although the price-earnings ratio for Japanese shares exceeds that for equities traded on other markets, several recent studies [Daiwa (1989), Hayashi and Inoue (1990), Hoshi and Kayshap (1990), and Japan Securities Research Institute (1989)] have reported that Tobin's (1969) "q", the ratio of the market value of Japanese firms to the replacement cost of their assets, is less than or equal to unity. The recent increase in Japanese equity values coincides with a rapid increase in Japanese land prices. Table 5 presents data on the composition of physical assets for U.S. and Japanese nonfinancial corporations at the end of 1984 and the end of 1987. Land accounts for more than half of the tangible assets of Japanese firms, compared with just over twelve percent for U.S. corporations. Moreover, the value of Japanese corporate land holdings nearly doubled between 1984 and 1987, and prices have increased further since then.

The observation that land prices have risen in tandem with stock prices does not explain why assets trade at higher multiples of their earnings in Japan than in other places, or why this multiple increased during the mid-1980s. Recent data on office space rents and land prices in major metropolitan areas display the pattern of high price-earnings multiples that one observes in the Japanese stock market. For example, although the price of residential land in Tokyo is 150 times that in New York City, the monthly rent

on new commercial office space in Tokyo is only four times that in New York [Boone and Sachs (1989)]. Rationalizing these patterns requires either differences in discount rates, or investor expectations that at some future date rents in Tokyo will rise substantially relative to those in New York.

The time series movements of value-rent ratios and price-earnings ratios are similar. Although land prices have increased significantly in the last few years, rents have not. As with equities, the recent changes in land prices are more difficult to explain than the high level of prices. Ito (1988) identifies several reasons why land prices in Japan should be high relative to those in other nations: the tax system places very low burdens on land, especially in agricultural uses; higher population density makes the marginal product of land higher than that in many other developed nations; and the archaic system of land use precludes space-efficient development of high-rise office buildings and similar structures. None of these factors, however, seems to have changed during the last decade.

Rather than analyze land values, where data on cash flows and rentals are difficult to obtain, we focus on the valuation of equities. A successful explanation for high P/E ratios is also likely to explain the rapid growth in land prices and the current high price-rental ratio.

3. U.S. and Japanese Accounting Differences and P/E Ratios

Many explanations of the difference between Japanese and American price-earnings ratios focus on differences between Japanese and American accounting conventions. Even if accounting considerations can explain the historical difference between U.S. and Japanese P/E ratios, two factors make them unlikely to explain the dramatic growth of this difference during recent years. First, recent changes in Generally Accepted Accounting Practices

(GAAP) in Japan have reduced the accounting disparities between Japanese and American firms [Aron (1981, 1988)]. Second, as Figure 1 shows, the growth in the Japanese P/E ratio from 29.4 in 1985 to 54.3 in 1988 was dominated by rising stock prices, rather than by falling earnings. The real price per share tracks the price-earnings ratio reasonably well: it was roughly constant from 1970 to 1980, grew gradually during the next five years, and increased more rapidly in the last three years, with capital gains of 44% in 1986, 9% in 1987, and 41% in 1988. In contrast, real earnings per share were roughly constant over the 1970-88 period. A 28% decline in earnings per share in 1986 contributed to doubling the P/E ratio during that year, but the P/E remained above 50.0 in 1987 and 1988 despite annual earnings growth of 26% and 30%.

Even if differences in accounting conventions cannot explain the recent divergence between Japanese and American P/E ratios, they may explain the smaller historical disparity in these ratios. Three accounting practices are particularly important: (i) differences in reporting consolidated versus parent-company earnings; (ii) differences in "reserve accounts" that permit Japanese firms to deduct significant amounts from reported earnings as advance funding for future expenses; and (iii) differences in depreciation practices. This section discusses each of these differences in turn, and concludes with a brief analysis of the divergence between accounting and economic profits in Japan and the United States.

3.1 Consolidation and Intercorporate Ownership

Consolidated earnings, which include the net income of subsidiaries and of firms in which the parent holds more than 20% of the outstanding equity, are the dominant measure of earnings in the United States. In contrast, unconsolidated earnings are the dominant measure in Japan. Unconsolidated

earnings are the basis for most Japanese market analyses, and they are used in the denominator of most common Japanese P/E ratios -- including the NRI index reported here. Since unconsolidated earnings reflect the dividends received from subsidiaries but not their undistributed profits, this leads to a systematic upward bias in P/E ratios for Japan relative to those in the U.S. For Toyota Motor Company, the cross-holding example presented in Table 2, the firm's consolidated earnings exceed its unconsolidated (parent) earnings by an average of 32% per year during the 1986-88 period.

These differential practices can be viewed in two ways. One holds that Japanese earnings are under-reported because they fail to include the undistributed earnings of subsidiaries. This perspective leads to a correction based on the ratio of consolidated to unconsolidated earnings, as in Aron (1988). The principal drawback of this strategy is that Japanese firms have substantial discretion regarding their consolidated earnings reports, so some earnings may escape consolidation.[6]

A second approach to this problem, in the spirit of our earlier adjustment for double-counting of equity holdings, estimates price-earning ratios under the assumption of no cross-holding. Variants of this approach are used by Ando and Auerbach (1990) and Ueda (1990). The premise of this approach is that parent (unconsolidated) earnings are overstated by intercorporate dividend receipts, but prices are overstated by even more because they capitalize future intercorporate dividends as well as undistributed earnings

[6]Since 1984, Japanese GAAP has required firms to report a measure of consolidated income that includes the earnings of subsidiaries in which the parent owns more than 20% of the outstanding equity. Subsidiaries in which the parent holds a smaller stake, as well as those which sum to less than 10% of consolidated net income, sales, or assets, may still be excluded. Although firms report consolidated earnings, parent company earnings are used in most Japanese P/E calculations.

of subsidiaries.

We follow the second approach, which suggests that two adjustments are needed to correct P/E ratios for consolidation. First, we adjust prices to remove that part of value derived from intercorporate equity holdings. Since we are interested in P/E ratios for nonfinancial corporations (NFCs), the adjusted price is $P^* = (1-\mu s')P$, where μ = (value of all traded shares)/(value of NFCs traded shares) and s' is the share of the total market owned by NFCs. This procedure essentially redefines the market value of nonfinancial corporations as the value of outstanding equity less the value of shares held on corporate account. Second, we remove intercorporate dividends from the reported earnings of parent firms. If the fraction of earnings paid out as dividends by both financial and nonfinancial corporations is d, then the relevant earnings measure is $E^* = (1-s'\mu d)E$. The adjusted price-earnings ratio is therefore

$$(2) \qquad (P/E)^* = [(1-s'\mu)/(1-s'\mu d)]*(P/E).$$

Table 6 shows the impact of the cross-holding adjustment on Japanese P/E ratios between 1975 and 1988. The first column presents the unadjusted P/E ratio for the NRI 350.[7] The second column shows the adjustment factor, $(1-s'\mu)/(1-s'\mu d)$, and the third column reports the value of $(P/E)^*$. In 1988, when the Japanese payout ratio (d) was .28 and $\mu s'$ equalled .407, the adjustment factor was .669. The cross-holding adjustment therefore reduces the reported P/E ratio from 54.3 to 36.3. The impact of cross-holdings on the P/E

[7]We study the P/E ratios for the NRI 350 and S&P Industrials at the end of each calendar year. The S&P ratio divides earnings for each calendar year by year-end prices. For the NRI 350, the Nomura Research Institute forecasts what earnings will be in the current fiscal year, which typically ends in March, and divides these forecasts by December prices. This biases the Japanese P/E ratio downward relative to the U.S. ratio when earnings are rising.

ratio grows through time. This largely reflects an increase in the degree of cross-holding during the last decade.

3.2 Accounting for Special Reserves

The Japanese tax code allows firms to set aside funds each year in reserves against future contingencies including product returns, repairs, payments on guarantees, losses due to doubtful accounts, and payment of retirement benefits. Japanese workers retire when they are roughly sixty years old, and their employer typically provides a large one-time retirement payment. This payment can equal several times the employee's annual salary. Japanese tax law permits firms to create a reserve equal to 40% of the amount workers would receive if the firm were liquidated, and all workers retired, at the close of the fiscal year.

Japanese accounting practices require conformity between tax returns and financial statements. Thus, when Japanese firms use special reserves to reduce their taxable income, they reduce their accounting earnings as well. The net effect of contributing before-tax income to these reserves is a reduction in reported earnings relative to what they would be in the U.S.

Aron (1988) suggests a procedure for undoing the effect of reserve contributions on reported earnings. He calculates the net contribution firms made to reserve accounts and notes that without such contributions, after-tax earnings would increase

$$(3) \qquad E_{adj} - E_{report} = (1 - \tau)*(\text{Net Reserve Contribution}),$$

where τ is the corporate tax rate. Shoven and Tachibanaki (1987) and Aron (1988) estimate the combined marginal tax rate from national corporate income tax, enterprise tax, and local inhabitants tax at between 50 and 55%. We use a value of $\tau = .52$ for 1988, with lower levels in earlier periods correspond-

ing to lower statutory rates on corporate income. We use Aron's estimate that reserve contributions average approximately four percent of net income for large Japanese firms over the entire 1975-88 period. The resulting adjustment factor, shown in the fourth column of Table 6, has a small effect on the reported price-earnings ratio.

3.3 Depreciation Accounting

The last major difference between the accounting practices of U.S. and Japanese firms concerns depreciation. In the U.S., the possibility of using one set of accounting rules for tax purposes and another for financial reporting leads most firms -- 75% according to Schieneman's (1986) citation of the American Institute of Certified Public Accountants -- to choose accelerated depreciation for the former and straight-line depreciation for the latter. This reduces current taxable income relative to reported earnings.

Japanese firms, which must use the same depreciation policy for tax and financial reporting purposes, typically choose tax minimization over the maximization of reported earnings. Virtually all firms use double-declining balance depreciation. Since the typical Japanese firm depreciates its assets more quickly than the typical American firm, Japanese depreciation charges are higher when assets are relatively new and lower when they are old. Since most Japanese firms are growing rapidly, they will have a preponderance of young assets with depreciation deductions in excess of those of comparable U.S. firms. Reported earnings will therefore be lower for Japanese firms.

Several studies, including Aron (1988), have tried to correct reported earnings for different depreciation rules by assuming that the ratio of depreciation to cash earnings should be identical for U.S. and Japanese firms. Since different depreciation rates are not the only reason for differences in

the amount of depreciation claimed by U.S. and Japanese firms, however, this assumption is likely to correct more than just accounting practices. For example, Japanese firms are more capital-intensive than U.S. firms, so this adjustment is likely to overstate the true earnings of Japanese firms.

Exact comparison of the depreciation claims of U.S. and Japanese firms would require detailed information on the asset mix and investment history of firms in both nations, information which is not readily available. We therefore employ two alternative procedures for generating comparable depreciation claims for U.S. and Japanese firms. The first provides an upper bound on the possible differences between firms in the two countries, while the second is a more reasonable estimate of the depreciation-induced earnings differential.

Our upper bound procedure, which we label Method I, computes the straight line depreciation which Japanese firms would have reported if all their assets had been placed in service during the last year. Under the Japanese tax code, the annual double-declining balance (DDB) depreciation rate is given by

$$\delta = 1 - .1^{1/L} ,$$

where L is the asset life in years.[8] This rate is approximately equal to 2/L. For example, if L is eight, the DDB depreciation rate is 25%; if L is 20, δ is 10.9%. By comparison, the annual straight-line depreciation is 1/L times the original depreciable value. If an asset's estimated salvage value is zero, the initial depreciable basis is the same for accelerated and straight-line depreciation. Thus, the DDB depreciation is approximately twice

[8] If this depreciation rate were used over the life of the asset, the depreciated value would be ten percent of the original value after L years. However, since the double-declining balance rate is applied to the asset's current book value, at some point the annual deduction from straight-line depreciation on the asset's remaining book value will exceed the DDB deduction. The firm may switch to straight-line depreciation at that time.

the straight-line depreciation when an asset is first placed in service. Our upper bound estimate of excess depreciation is therefore half of the reported DDB depreciation charge, D/2. If this adjustment were correct, then during periods when accounting depreciation was below tax depreciation, there would be an increase in the deferred tax account of $\tau*(D/2)$. The resulting Method I adjustment to earnings is therefore an increase of $(1-\tau)*D/2$. This adjustment is about the same magnitude as Aron's (1988) adjustment using the ratio of depreciation to cash flow.

To estimate the importance of the depreciation correction we use the parent-company accounting reports in the Diawa Analysts Guide, which presents information on the financial accounts and balance sheets for virtually all nonfinancial firms listed on the First Section of the TSE. For these firms, the ratio of $(E_{report} + (1-.52)*D/2)/E_{report}$ is 1.52 in 1987. Earnings would therefore be 52% higher under this extreme assumption about the size of the depreciation adjustment. We use this ratio to correct each year's earnings for the NRI 350. The resulting adjusted P/E ratio is shown in column six of Table 6. For example, in 1988 the Japanese P/E declines from 36.3 after the cross-holding correction to 23.2, still well above the U.S. P/E ratio.

The foregoing method of converting accelerated to straight-line depreciation is appropriate if all Japanese assets were placed in service during the previous year. Under more realistic assumptions, however, this estimate overstates the actual difference between DDB and straight-line depreciation because it ignores the fact that, while the depreciable basis for the straight line calculation remains constant, the basis for the DDB calculation declines as the asset ages.

Our second method of estimating the depreciation-induced understatement of income, Method II, attempts a more sophisticated correction for the

difference in depreciable basis between double-declining balance and straight-line depreciation. We assume that firms have homogeneous assets with identical economic depreciation rates (δ), and that their time path of investment is described by exponential growth at rate g, which we estimate from the ten-year growth rate of nominal business investment in the national income accounts. For such firms, the current DDB depreciation charge per dollar of current investment is $2\delta \int_0^\infty e^{-gs}e^{-2\delta s}\, ds = 2\delta/(2\delta + g)$. We estimate δ as one-half the ratio of current depreciation charges to the value of depreciable assets, since for Japanese firms using double declining balance methods the instantaneous depreciation rate will be approximately twice the economic rate. We then define $L'(\delta)$ as the tax lifetime associated with an asset depreciating at rate δ. We assume L' is the age at which one-half of the asset will be eroded [$L'(\delta) = (\ln 2)/\delta$]. If depreciation consists of random failures, this assumption implies that half of all assets live beyond their stated lifetimes. Using $L'(\delta)$ we then compute the depreciation per dollar of current investment under the straight-line assumption; this is $\int_0^{L'} e^{-gs}\, ds/L' = (1 - e^{-gL'})/gL'$. Our correction factor for the under-reporting of depreciation is therefore given by $(1-\tau)*[1 - (1 - e^{-gL'})*(2\delta+g)/2\delta gL']$.

We present the ratio of reported earnings to adjusted earnings in the seventh column of Table 6. The results suggest more modest changes than those implied by the earlier depreciation correction. The earnings adjustment factor (the ratio of reported to adjusted earnings) is now greater than .90 in each of the years we examine. This adjustment procedure, which is more plausible than simply halving the depreciation charges, yields <u>adjusted</u> P/E ratios of more than thirty for the last three years.

The price-to-cash-earnings (P/CE) ratios reported by MSCI provide additional perspective on the impact of the different depreciation methods

used by U.S. and Japanese firms. Since cash earnings are defined as the sum of reported earnings plus depreciation, they are unaffected by a company's choice of depreciation method. The U.S. P/CE ratio (not reported) exhibits no particular trend during 1973-88 and equals 6.5 at the end of 1988. Similarly, the Japanese price-to-cash-earnings ratio follows no particular pattern between 1973 and 1982, varying between 5.0 (1974) and 7.7 (1976). It grows systematically, however, during the last six years of the sample. The ratio is 9.0 in 1985, 14.4 in 1986, 14.7 in 1987, and 17.2 in 1988. Like the adjusted price-earnings ratios in Table 6, recent Japanese price-to-cash-earnings ratios are unusually high.

3.4 Adjusted American P/E Ratios

The adjustments for depreciation and reserves described above attempt to make reported earnings of Japanese firms comparable to those of U.S. firms. The adjustment for intercorporate holdings, however, converts Japanese earnings to a base case with no intercorporate ownership. Thus, we must also adjust the P/E ratio of the S&P Industrials to remove the effects of U.S. intercorporate holdings. The last two columns of Table 6 present the unadjusted S&P P/E ratio and the adjusted series using the procedure we applied to the Japanese data. Since intercorporate holdings in the U.S. are smaller than those in Japan, the adjusted P/E ratio (11.7 in 1988) is much closer to the unadjusted value (12.9).

Although accounting adjustments reduce the differences between Japanese and American P/E ratios, they do not eliminate them, particularly during the critical 1986-88 period. For example, the adjusted U.S. P/E ratio is 11.7 at the end of 1988. The comparable estimates for Japan are 23.2 using depreciation-adjustment Method 1 and 32.1 using Method 2. Moreover, both of the

adjusted ratios almost double during 1986. Accounting-based hypotheses can explain much of the difference between U.S. and Japanese P/Es before 1986, but they cannot explain the doubling of Japanese ratios in 1986 nor the high levels since then.

3.5 Accounting versus Economic Earnings

The foregoing discussion focused on the comparability of accounting earnings in the U.S. and Japan. Accounting earnings may not reflect the true economic earnings that underlie firm value. Deviations between economic and accounting profits cause reported price-earnings ratios in different nations to diverge, and changes through time in this deviation could lead to divergent movements in P/E ratios across nations.

Inflation is the principal source of differences between accounting and economic earnings. First, because depreciation is calculated using the historical cost of physical assets, true depreciation costs are understated and profits are overstated in high inflation periods. Second, the failure to distinguish between the real and nominal cost of debt understates earnings during periods of high inflation. Although the economic cost of borrowing is measured by the real interest rate, reported earnings reflect nominal interest charges. The higher debt-equity ratios of Japanese than U.S. firms during much of our sample period makes this overstatement more important for Japanese than for U.S. earnings. Third, inflation induces spurious profits for goods held in inventory or for assets which are sold. Nominal appreciation of inventories is recorded as a profit, even though the firm receives no real gains. Similar problems arise if the firm sells appreciated assets, since accounting profits will show the nominal rather than the real capital gain.

Ando and Auerbach (1988) study the differences between accounting and economic earnings in Japan and the United States due to the distortions described above. For the high-inflation period 1967-83, the average reported earnings/price ratio for their sample of Japanese firms was .065, while that for their U.S. sample was .094. After correcting earnings for inflation-induced errors, they find a "corrected" E/P ratio of .092 in Japan and .085 in the United States. Because of differences in leverage between U.S. and Japanese firms and differences in depreciation rates, inflation led to overstatement of U.S. earnings but understatement of economic earnings for Japanese firms.

Inflation during the decades before 1985 caused Japanese P/E ratios to be higher than they would have been if accountants measured economic earnings, and had the opposite effect in the United States. While this may further explain the historical disparity in the level of P/E ratios across countries, it makes it more difficult to explain the changes since 1985. The slowing of inflation, which reduced the disparity between accounting and economic earnings, should have reduced measured Japanese P/E ratios and raised their U.S. counterparts. This effect is strengthened by the fact that Japanese inflation rates declined faster than U.S. inflation rates during the period after 1984. Rather than explaining recent events, the disparity between economic and accounting earnings therefore magnifies the P/E puzzle.

4. Required Returns and Expected Growth: Japan and the U.S.

The apparent inability of accounting factors to explain why adjusted Japanese price-earnings ratios are high in relation to historical values and in relation to current U.S. P/Es leads us to consider two alternative explanations. First, growth opportunities in Japan may account for a larger fraction

of firm value than they did in the past and than they do in the U.S. Second, the required return on equity in Japan may be low relative to its historical value and relative to the current U.S. rate. This section examines these explanations for the Japanese stock market boom of the mid-1980's.

4.1 Growth and Required Returns in Infinite and Finite-Horizon Models

Miller and Modigliani (1961), in their classic paper on share valuation, offer a convenient framework for considering the effect of expected growth and required returns on price-earnings ratios. In their model, the discount rate r is constant and firms can invest a fraction k of each period's earnings in projects that have a perpetual supernormal return of r*. If the firms pay out their remaining earnings as dividends, earnings grow at the rate g = kr* while the supernormal investment opportunities are available.

Under the extreme assumption that the supernormal opportunities are available forever, Miller and Modigliani show that the value of the price-earnings ratio is given by

$$(4) \qquad P/E = (1-k)P/D = (1-k)/(r-kr^*) = (1-k)/(r-g).$$

With the more realistic assumption that the perpetual supernormal investment opportunities are only available for the next T years, they approximate the price-earnings ratio as

$$(5) \qquad P/E = [1 + kT(r^* - r)]/r = [1 + T(g - kr)]/r.$$

In Table 7 we use these relations, along with the 1985 and 1986 adjusted P/E ratios, to estimate the implied growth rate g for various required returns r. Under the extreme assumption that Japanese firms will always be able to invest their retained earnings in supernormal investment opportunities (infinite T), the estimated value of r-g in the first panel of Table 7 falls from 2.25% in 1985 to 1.37% in 1986. This implied change, coupled with the

large increase in Japanese asset values and P/Es that occurred over this period, illustrates the non-linearity of equation (4). When the P/E ratio is large, the implied value of r-g is small and subject to large percentage changes with relatively small absolute changes. Thus, if we are willing to assume that supernormal investment opportunities will always be available in Japan, the doubling of P/Es in 1986 can be explained by a less than one percentage point decline in the required return or by a similar increase in the (perpetual) growth rate.

The results for ten and twenty-five years of supernormal growth opportunities illustrate that the foregoing calculations are sensitive to the assumption that new opportunities are available forever. Using a long-term growth forecast of about 4.5% per year (which is comparable to the reported expectations of Japanese growth for 1985 discussed below) and a horizon of 10 years, the estimates in the lower panel of Table 7 imply that the required return on Japanese equity was about six percent at the end of 1985. If the required return remained at six percent, the doubling of the adjusted P/E ratio from 1985 to 1986 implies a ten percentage point increase in the expected annual growth rate, to 14.48% per year for the next ten years. Alternatively, one can hold the expected growth rate fixed at 4.5%. In this case, equation (5) implies that the required return in Japan fell from about six percent in 1985 to 3.55% in 1986.

If the supernormal growth opportunities in Japan were expected to persist for twenty-five years, the implied changes in r and g from 1985 to 1986 are smaller, but they are still substantial. For example, if the expected growth rate is assumed to be 4.5% in both 1985 and 1986, the implied required return falls from 6.5% to 4.5%. This decline is more than twice the change implied by the perpetual growth model.

With the assumption that supernormal profits are not available forever, the doubling of Japanese P/Es in 1986 requires a substantial reduction in required returns, a substantial reduction in expected growth rates, or both. Neither growth expectations nor required returns can be measured explicitly, but in the next two subsections we provide some suggestive evidence on the movements in these variables during the mid-1980s.

4.2 Evidence on Changing Growth Expectations

Long-term growth forecasts made by econometric forecasting firms provide some guidance regarding investors' growth expectations. Table 8 presents long-term forecasts of growth made by Data Resources, Inc., a major U.S. forecasting firm. Although these forecasts are for real GNP, not corporate earnings, they provide evidence on the pattern of growth expectations during the 1980s. There is a small decline in the ten-year forecasts for the U.S. between 1984 (2.9%) and 1988 (2.3%). The ten-year growth rates forecast for Japan are surprisingly constant, varying between 4.3% in 1985 and 3.9% in 1988. DRI's five-year forecasts for Japan display somewhat greater volatility, declining from 4.0% in 1985 to 3.3% in 1987, and then rising to 3.9% in 1988. Five-year forecasts from the Japan Center for Economic Research (4.6% in 1985, 3.0% in 1986, 3.8% in 1987, and 3.2% in 1988) also suggest that growth expectations in Japan declined from 1985 to 1986.

These growth forecasts do not support the view that accelerating growth expectations in Japan are responsible for the 1986 rise in share values. If anything, the expected growth rate for the next decade declined. While some might argue that equity values depend on growth forecasts over periods longer than a decade, revisions in longer-term growth prospects are not likely to explain the observed price changes. As the horizon grows, forecasts of

significantly more rapid growth in one economy than in another become less reliable and less plausible. Recent empirical findings [see Barro (1989)] suggest that national growth rates exhibit mean reversion. It is also difficult to imagine the type of news which investors could have received which would affect growth prospects more than a decade into the future without changing near-term growth forecasts. Thus, there is little reason to believe that changes in expected growth can explain the recent increase in Japanese stock prices.

4.3 Required Returns

The framework presented above demonstrates that P/E ratios depend on both required equity returns and expected growth rates. Unfortunately, measuring required returns is even more difficult than calibrating growth expectations. Ex ante expected returns are not observable, and neither the risk premium on equities nor the required return on riskless assets can be estimated precisely from historical data on asset returns [see Merton (1980)].

Before considering the recent changes in some proxies for required returns, it is useful to consider the theoretical issue of whether differences between required returns in the U.S. and Japanese equity markets are consistent with capital market equilibrium. Given the increasing integration of world financial markets, required returns in each market are linked to those in other markets. The linkage between U.S. and Japanese financial markets has grown significantly during the last decade. Prior to 1980, and to a lesser extent between 1980 and 1986, Japanese investors faced capital controls which limited their ability to invest in other markets. Since 1986, however, explicit barriers to capital mobility into and out of Japan have been minimal. Recent studies [see Ito (1990) for a survey] suggest that short-term riskless

interest rates in Japan are now determined by world market conditions. Whether markets for long-term assets such as corporate equities are equally well integrated remains an open issue.

Required equity returns in the U.S. and Japan could differ for at least three reasons. First, investors may expect systematic long-term changes in real exchange rates. Frankel (1989) presents evidence of "country effects" in real interest rates, and argues that these are the result of expected currency movements. From this perspective, real interest rates and required equity returns which are lower in Japan than in the U.S. would be consistent with expectations that, after adjusting for inflation, the yen will appreciate against the dollar.

There is little evidence, however, that investors expected real yen appreciation in the late 1980s. There are two competing interpretations of the behavior of real exchange rates. One view, supported by evidence in Rogalski and Vinso (1977), Roll (1979), and Adler and Lehmann (1983), says that real exchange rates are essentially random walks. The alternative view, which is supported by evidence in Frankel (1989) and Cutler, Poterba, and Summers (1990), says that real exchange rates are mean reverting. Neither view would have predicted the yen to appreciate in the 1986-88 period.

A second possibility is that perceived risks associated with cross-border equity investments allow substantial disparities between expected returns in different markets. Despite large cross-border capital flows during the 1980s, most corporate equity is still held in the country of issue [see French and Poterba (1990)]. In 1988, foreign investors held only 6.5% of the U.S. stock market and 4.3% of the Japanese market. The cross-border equity flows to date may therefore be insufficient to equate expected returns. This argument is

consistent with frequent claims that Japan's high saving rate has reduced required returns on Japanese assets relative to similar assets in the U.S.

Third, taxation could lead to differences in required returns demanded by U.S. and Japanese investors. If capital markets are not perfectly integrated, differences in local tax rates can cause differences in the pretax returns demanded by investors in each market. In addition, some investors face different tax burdens on foreign and domestic securities which make them imperfect substitutes. For example, U.S. pension funds cannot reclaim the 20% dividend withholding tax which Japan levies on dividend payments to foreign investors. Similar problems may affect some Japanese investors since the U.S. also requires 20% withholding on dividends remitted abroad.

The foregoing considerations make it impossible to determine on a priori grounds whether there are differences between the expected returns on long-term assets in Japanese and U.S. capital markets. We therefore consider the available empirical evidence on long-term real interest rates in the two nations in an effort to evaluate required returns on riskless assets: we do not attempt to measure the equity risk premium.

Nominal interest rates in both Japan and the United States declined significantly between 1985 and 1988. Table 8 reports the nominal rates on both U.S. and Japanese ten-year government bonds during 1980-88. Japanese long-term rates declined by 150 basis points from 1985 to 1988, a factor which is often cited [for example by Takagi (1989)] as influential in the rise in equity and land prices. However, the significant increase in Japanese prices and price/earnings ratios (or price/rent ratios) during this period must be explained by changes in real, not nominal interest rates.

Macroeconomic forecasts of long-term Japanese inflation rates suggest that real interest rates also declined in the mid-1980s. The sixth and

seventh columns of Table 8 report estimates of real yields calculated by subtracting Data Resources' long-term forecast of annual inflation from the contemporaneous nominal yield on government bonds. These estimates suggest that the real Japanese interest rate declined from 4.1% in 1985 to 2.9% in 1986. Similar estimates based on the five-year inflation forecast of the Japan Center for Economic Research suggest a real interest rate of 4.4% in 1985 and 3.1% in 1986, a decline of about 125 basis points during the year when P/E ratios doubled.

There is an even larger decline in real interest rates in the U.S. DRI's ten-year inflation forecasts imply that the real yield on U.S. government bonds fell from 4.4% in 1985 to 2.6% in 1986, a drop of 280 basis points. The real interest rates in Table 8 also show that, prior to the removal of capital controls in the mid-1980s, estimated real long-term interest rates in Japan were more than 150 basis points lower than those in the U.S.

The substantial changes in crude measures of required returns on long-term riskless assets suggest that required returns on corporate equities also declined, both in Japan and the United States, during the 1985-86 period. The key questions are whether the decline in required returns is consistent with a much smaller increase in U.S. than Japanese prices and P/E ratios given the substantially larger decline in the U.S. rate, and whether the decline in required returns in Japan is large enough to explain the Japanese P/E rise.

Several factors might explain why U.S. prices and price/earnings ratios increased less than their Japanese counterparts. First, the relation linking prices to required returns and expected growth rates is not linear. Since the U.S. P/Es began at a lower level, the same absolute change in required returns should have a larger effect in Japan than in the U.S.

Second, the rise in U.S. P/E ratios may have been blunted by tax changes in 1986. These changes lowered marginal tax rates on interest and dividend income for top-bracket individual investors from 70% to 28%. Part of the reduction in the tax burden on dividends, however, was offset by an increase in capital gains tax rates. For individual investors the net effect of the tax changes should have been a substitution toward debt and away from equity.

In contrast, for an important class of Japanese investors, tax changes during the mid-1980s reduced after-tax returns on debt relative to those on common stock. Before 1987, Japanese individual investors were able to avoid taxation on interest through a system of Maruyu accounts. Each individual could receive tax-exempt interest on up to 14 million yen in assets, or roughly $112,000 ($448,000 for a family of four). These limits did not affect the many households who evaded taxation by establishing multiple accounts [see Nagano (1988)], and by the mid-1980's, nearly 70% of Japan's personal savings were exempt from taxation [Japan Securities Research Institute (1988)].

The Maruyu system was largely eliminated by the 1987 Japanese tax reform. Prime Minister Nakasone appointed an Advisory Tax Commission in September 1985. In April 1986 the commission made an interim report suggesting abolition of Maruyu accounts, and legislation was introduced to the Japanese parliament in early 1987 and passed in September. Since the abolition of these accounts for most investors on April 1, 1988, households face a 20% tax on all interest income. These Japanese tax changes should have induced a substitution from debt to equity among some Japanese investors, possibly raising stock prices.[9]

[9]These tax changes did not affect the institutional shareholders who constitute a significant part of Japanese equity holdings.

Although these factors might explain why Japanese stock prices and P/Es increased by more than their U.S. counterparts, movements in required returns seem unable to explain why Japanese P/Es doubled in 1986. The behavior of long-term government bonds yields suggests that real riskless rates fell by about 1.25 percentage points during 1985-86. We are unaware of any evidence to suggest that equity risk premiums also fell during this period. In the Miller-Modigliani growth model, if supernormal investment opportunities were expected to persist for 25 years and earnings were expected to grow by 4.5% per year, a 1.25% decline in the required return implies that the adjusted P/E should have increased from 18.2 in 1985 to 27.7 in 1986. This implied value is much lower than our actual adjusted estimate of 35.7 for 1986.

The behavior of Japanese real interest rates in early 1990 also suggests that movements in required returns were not the only factor driving up Japanese stock prices and price/earnings ratios in 1985-86. Real interest rates increased by approximately 1.0% in January 1990. If the argument that movements of this magnitude were central in pushing up share prices is correct, prices should have fallen more sharply in the 1990 episode than they have at this writing.

5. Conclusions

The dramatic difference between reported price-earnings ratios in the United States and Japan is not as puzzling as it appears at first glance. Roughly half of the discrepancy is caused by differences in the accounting practices of the two countries. If Japanese firms used U.S. accounting practices, we estimate that the P/E ratio for the Tokyo Stock Exchange would have dropped from its reported value of 54.3 to 32.1 at the end of 1988. Accounting differences explain much of the persistent disparity between U.S.

and Japanese price-earnings ratios, but they appear unable to explain the doubling of Japanese P/E ratios in 1986, from 29.4 to 58.6.

Because Japanese stocks traded at high earnings multiples prior to the recent run-up, relatively small changes in either discount rates or growth expectations could lead to large changes in prices. We find no evidence of upward revisions in expected growth rates for the Japanese economy during this period. There is evidence of a substantial drop in required riskless returns between 1985 and 1986, but the decline appears to be too small to explain P/E movements as large as the actual changes.

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Table 1: Ownership of Common Stock, Japan and the United States

Ownership Group	Japan	U.S.
Individuals	20.1%	48.1%
Non-financial Corporations	30.1%	14.1%
Foreigners	5.3%	6.6%
Securities Companies	2.1%	0.4%
Government	0.9%	6.6%
Banks	19.3%	0.3%
Insurance Companies	16.8%	23.9%
Other	5.4%	0.0%

Source: Tokyo Stock Exchange, 1988 Fact Book; Federal Reserve Board, Flow of Funds (1987). For the U.S., mutual funds are included in individual holdings. Insurance company holdings are the sum of life, property & casualty, and pension fund assets.

Table 2: Equity Held by Toyota Motor Company, 1988

Company Name	Toyota Ownership Share	Net Income (Y mil)
Kanto Auto Works	49.0%	2,500
Toyota Auto Body	41.7%*	2,300
Chiyoda Fire & Marine Insurance	41.4%	6,100
Toyoda Gosei (steering wheels & hoses)	40.0%	2,400
Kyowa Leather	32.4%*	1,600
Tokai Rika (Switches & Seat Belts)	27.8%	1,500
Toyota Automatic Loom Works	24.9%	10,100
Toyoda Machine Works	24.7%	1,600
Toyota Tsusho (Trading)	23.2%*	5,400
Nippondenso (Auto Electronics)	22.5%*	28,000
Koyo Seiko (Bearings)	22.3%	3,300
Aichi Steel	21.8%	3,150
Aisin Seiki (Autoparts)	21.3%*	7,500
Chuo Spring	20.5%	1,070
Koito Manufacturing (Auto lights)	19.8%	2,900
Daihatsu	15.0%	4,000
Akebono Brake	15.0%	1,250
Futaba Industrial (Mufflers)	14.3%	2,350
Shiroki (Auto Interiors)	11.6%	1,000
Hino Motors (Trucks)	11.0%	4,300
Toyoda Spinning & Weaving	8.9%*	400
Kayaba Industrial (Hydraulics)	8.4%	1,200
Nippon Piston Ring	8.6%	580
Ichikoh Industries (Auto lights)	7.5%	1,400
Nachi-Fujikoshi (Bearings)	5.9%	1,100
Toyo Radiator	5.8%	1,100

Toyota Motors is Owned By:	
Sanwa Bank	4.9%
Tokai Bank	4.9%
Mitsui Bank	4.9%
Toyota Automatic Loom	4.4%
Nippon Life	3.7%
Long-Term Credit Bank	3.2%
Daiwa Bank	2.5%

Source: Authors' tabulations from Japan Company Handbook, Spring 1988. Starred entries indicate substantial ownership by other firms affiliated with Toyota Motors, usually Toyota Automatic Loom.

Table 3: Market Value of Japanese and U.S. Equity Markets, 1970-88

Year	Total Market Value (Billions of Dollars) Japan	U.S.	Adjusted Market Value (Billions of Dollars) Japan	U.S.	Fraction of Total World Equities Japan	U.S.
1970	42.5	636.4	25.2	671.8	2.8	74.1
1971	67.2	741.8	39.8	784.7	3.7	72.3
1972	152.3	871.5	81.6	890.3	6.2	68.1
1973	128.6	721.0	69.2	668.2	6.6	63.7
1974	115.8	510.4	63.7	436.1	8.1	55.8
1975	135.1	683.6	75.9	660.8	6.9	60.3
1976	179.3	856.4	100.0	786.2	8.2	64.4
1977	205.1	793.9	116.1	742.1	9.3	59.5
1978	327.3	816.7	183.0	787.6	12.6	54.0
1979	274.0	960.2	153.2	923.5	9.1	55.1
1980	356.6	1240.0	200.8	1179.9	9.5	56.0
1981	402.7	1145.4	225.1	1106.7	11.2	54.9
1982	410.2	1308.3	232.2	1281.5	10.8	59.7
1983	519.2	1578.3	286.6	1506.3	11.2	59.0
1984	616.8	1593.2	327.5	1477.6	12.9	58.2
1985	909.1	1955.4	480.0	1845.7	13.7	52.7
1986	1746.2	2203.2	883.6	2187.2	18.5	45.9
1987	2978.2	2216.1	1489.1	2173.8	26.5	38.7
1988	3840.2	2480.9	1920.1	2397.1	28.7	35.9

Note: The total equity value for Japan is from Tokyo Stock Exchange, Monthly Statistical Report, and the value for the U.S. is from NYSE, NASDAQ, and SEC sources described in the text. The adjusted market values exclude intercorporate equity holdings. Our estimates of each country's weight in the world equity portfolio ignore all cross-holdings except those in Japan and the U.S.

Table 4: Price-Earnings Ratios, Dividend-Price Ratios (in Percent), Foreign Equity Holdings (in Percent), and Debt-Equity Ratios, Japan and the United States, 1970-1988

	Price/Earnings		Dividend/Price		Foreign Holdings		Debt/Equity	
Year	Japan	U.S.	Japan	U.S.	Japan	U.S.	Japan	U.S.
1970	9.0	18.6	3.9	3.3	4.9	3.7	1.63	.54
1971	13.5	18.7	3.9	2.9	5.2	3.6	2.13	.50
1972	23.3	19.3	2.4	2.5	4.5	4.0	2.23	.48
1973	13.9	12.3	2.1	3.4	4.0	4.3	1.38	.69
1974	16.5	7.9	2.7	5.0	3.2	4.5	1.44	1.04
1975	25.2	11.8	2.5	3.8	3.6	4.8	2.13	.78
1976	22.0	11.2	2.1	3.7	3.7	4.7	1.88	.72
1977	19.3	9.1	2.0	5.0	3.0	4.6	1.92	.85
1978	21.5	8.2	1.7	5.2	2.7	4.7	1.62	.91
1979	16.6	7.5	1.8	5.3	3.0	4.6	1.78	.83
1980	17.9	9.6	1.6	4.4	5.8	4.8	1.59	.64
1981	24.9	8.2	1.5	5.3	6.4	5.1	1.64	.76
1982	23.7	11.9	1.4	4.6	7.6	5.3	1.44	.70
1983	29.4	12.6	1.2	3.7	8.3	5.6	1.03	.62
1984	26.3	10.4	1.2	4.1	8.8	5.6	.93	.74
1985	29.4	15.4	1.2	3.4	7.4	5.9	.71	.66
1986	58.6	18.7	0.8	3.0	7.0	6.7	.45	.65
1987	50.4	14.1	0.8	3.2	5.3	7.0	.43	.71
1988	54.3	12.9	0.6	3.0	4.8	7.2	.36*	.71*

Source: Entries reflect values on last trading day of each year. Foreign holdings of U.S. equity are from the Federal Reserve Board Flow of Funds tables. Foreign holdings of Japanese equity are from the Tokyo Stock Exchange, with 1988 value estimated from monthly net sales data in Monthly Statistics Report. The debt-equity ratio is defined as the book value of debt divided by the market value of equity. The debt-equity ratios for the U.S. are from the Federal Reserve Board, Balance Sheets of the U.S. Economy, 1988. The debt-equity ratios for Japan for 1970-75 are from Ando and Auerbach (1988). Ratios for 1976-87 are based on the data for "All Industries" in Daiwa (1980, 1984, 1987, and 1988). Starred values for 1988 are the authors' estimates.

Table 5: Asset Composition of U.S. and Japanese Firms

	United States		Japan	
	1984	1987	1984	1987
	(Billions of Dollars)		(Trillions of Yen)	
Land	464.0	553.8	221.7	403.4
Plant & Equipment	2644.9	3021.4	206.4	274.5
Inventories	740.9	809.7	55.8	53.5

Source: U.S. Federal Reserve Board, Balance Sheets of the U.S. Economy, and Japan Economic Planning Agency, Annual Report on National Accounts. The Japanese firms consist of nonfinancial corporate enterprises excluding public enterprises, whose asset holdings are computed as the difference between closing asset stocks of the general government and those of public institutions, the sum of government plus public enterprises.

Table 6: Adjusted Price-Earnings Ratios, Japan and United States, 1975-1988

	Japan								United States	
		Cross-Holding			Depreciation Adjustment					
	Unadjusted		Interim	Reserves	Method 1		Method 2		Unadjusted	Adjusted
Year	P/E	Factor	P/E	Factor	Factor	P/E	Factor	P/E	P/E	P/E
1975	25.2	0.784	19.8	0.98	.599	11.5	.905	17.2	11.8	11.0
1976	22.0	0.824	18.1	0.97	.655	11.6	.920	16.1	11.2	10.1
1977	19.3	0.797	15.4	0.97	.684	10.2	.926	13.7	9.1	8.1
1978	21.5	0.792	17.0	0.97	.704	11.7	.931	15.3	8.2	7.5
1979	16.6	0.778	12.9	0.97	.717	9.0	.935	11.7	7.5	6.8
1980	17.9	0.770	13.8	0.97	.755	10.1	.947	12.6	9.6	8.7
1981	24.9	0.764	19.0	0.97	.702	13.0	.932	17.1	8.2	7.6
1982	23.7	0.769	18.2	0.97	.700	12.4	.931	16.3	11.9	11.1
1983	29.4	0.795	23.4	0.97	.692	15.8	.936	21.1	12.6	11.9
1984	26.3	0.734	19.3	0.97	.711	13.3	.943	17.5	10.4	9.4
1985	29.4	0.694	20.4	0.97	.668	13.3	.924	18.2	15.4	14.2
1986	58.6	0.695	40.7	0.98	.624	24.8	.908	35.7	18.7	17.5
1987	50.4	0.665	33.5	0.97	.660	21.5	.920	29.8	14.1	12.9
1988	54.3	0.669	36.3	0.97*	.660*	23.2	.920*	32.1	12.9	11.7

Source: Authors calculations described in the text. The unadjusted P/E ratios correspond to the NRI 350 index and the S&P Industrials index. Starred values for 1988 are estimated using 1987 data.

Table 7: The Implied Difference between the Required Return r and the Growth Rate g with Perpetual Growth Opportunities (Panel A) and the Implied Growth Rate with Supernormal Investment Opportunities of Various Durations, T (Panel B), Japan and U.S., 1985 and 1986

Panel A: The Implied Difference between the Japanese Required Return r and the Growth Rate g Assuming Perpetual Growth Opportunities

	r-g	P/E	k
Japan:1985	2.25	18.2	0.59
Japan:1986	1.37	35.7	0.51
U.S.:1985	3.59	14.2	0.49
U.S.:1986	3.20	17.5	0.44

Panel B: The Implied Growth Rate with Supernormal Investment Opportunities of Various Durations, T

	Required Return, r								
T	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
				Japan:1985					
10	-2.77	-1.56	-0.36	0.84	2.05	3.25	4.46	5.67	6.87
25	-0.05	0.61	1.27	1.93	2.59	3.25	3.91	4.57	5.23
∞	0.75	1.25	1.75	2.25	2.75	3.25	3.75	4.25	4.75
				Japan:1986					
10	2.24	4.28	6.32	8.36	10.40	12.44	14.48	16.52	18.56
25	1.81	2.78	3.75	4.72	5.69	6.66	7.63	8.60	9.57
∞	1.63	2.13	2.63	3.13	3.63	4.13	4.63	5.13	5.63
				U.S.:1985					
10	-4.27	-3.31	-2.36	-1.41	-0.45	0.50	1.46	2.41	3.37
25	-0.83	-0.30	0.23	0.76	1.29	1.82	2.35	2.88	3.41
∞	-0.59	-0.09	0.41	0.91	1.41	1.91	2.41	2.91	3.41
				U.S.:1986					
10	-3.43	-2.33	-1.24	-0.15	0.95	2.05	3.14	4.23	5.33
25	-0.58	-0.01	0.56	1.13	1.70	2.27	2.84	3.41	3.98
∞	-0.20	0.30	0.80	1.30	1.80	2.30	2.80	3.30	3.80

Source: The estimates in Panel A and the infinite horizon estimates in Pa are calculated using equation (4) in the text, $P/E = (1-k)/(r-g)$. The timates for 10- and 25-year horizons are calculated using equation (5) $P/E = [1 + T(g - kr)]/r$.

Table 8: Expected Annual Growth Rates and Nominal and Real Yields on Long-Term Government Bonds, the United States and Japan, 1980-88

	Expected Long-Term Growth			Before-Tax Yields			
	U.S.	Japan		Nominal		"Real"	
	10-Year	5-Year	10-Year	U.S.	Japan	U.S.	Japan
1982	3.2	4.6		10.32	7.81	4.0	2.4
1983	3.2		3.8	11.43	7.42	5.6	4.2
1984	2.9	3.7	4.0	11.51	6.85	6.1	4.4
1985	2.9	4.0	4.3	9.05	6.32	4.4	4.1
1986	2.6	3.6		7.26	5.51	2.6	2.9
1987	2.3	3.3		8.91	5.15	3.9	3.3
1988	2.3	3.9	3.9	9.18	4.80	4.1	3.0

Notes: The U.S. long-term growth forecasts are from the winter issues of Data Resources, Inc.'s Long Term Review. For example, the 1980 forecast is from the winter 1980-81 issue. Japanese growth forecasts are from various issues of the Data Resources/Nikkei Japanese Review. Nominal yields are for the Nikkei Long-Term Government Bond Index and the Moody's 10-year Government Bond Index. The "real" yields are calculated by subtracting DRI's long-term inflation forecast from the contemporaneous nominal yield.

FIGURE 1 - REAL PRICE AND EARNINGS PER SHARE
FOR THE NRI 350 1970-88